

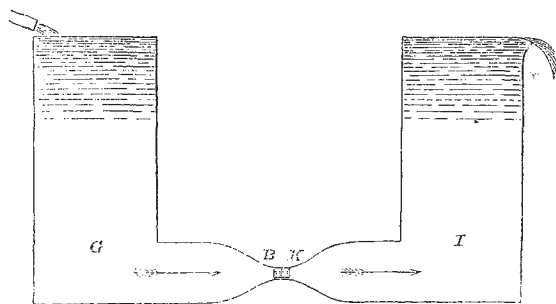
apparently to zero, or in reality as I have said to that of the atmosphere.

In the apparatus as here arranged, consisting of the discharging and the recipient cistern, with the intervening jet-orifice and recipient-orifice, the overflow of the recipient cistern is at 18 inches above the centre of the orifices.

As I continue to fill the discharge cistern, you observe the jet shoots across the open space between the orifices, and the water-level continues to rise in the recipient cistern; and so long as the head in the former is maintained at a moderate height above that in the latter, the whole of the stream enters the recipient orifice, and there is no waste except the small sprinkling which is occasioned by inexactness of aim, and by the want of exact circularity in the orifices.

When the head in the recipient has reached the overflow, and thus remains at a steady height of 18 inches above the orifices, the complete reception is insured by maintaining a head of $20\frac{1}{2}$ inches in the discharging cistern, or an excess of head of $2\frac{1}{2}$ inches on the discharge side; and this excess, in effect, represents the energy wasted in friction.

You observe that as I diminish the supply of water and allow the excess of head in the discharger to become reduced, a steadily increasing waste becomes established between the orifices; and it is interesting to trace exactly the manner in which the friction operates to produce this result.



If the conoids of discharge and reception are tolerably short as they are here, it is the outer annule or envelopes of the stream which are in the first instance affected, that is to say retarded, by friction, and the escape or waste between the orifices implies that this surface-retardation has reduced the velocity of those envelopes below that due to the head in the recipient; thus an annular counter-current is able to establish itself, and in fact constitutes a counter discharge from the recipient.

As the quantity of water which actually enters the recipient, or in other words the speed of the inflow, is reduced, the friction which belongs to that part of the stream is reduced also, but that which belongs to the issuing jet is unabated, and this circumstance virtually magnifies the waste; it is probable, however, that to the last the velocity of the central zones of the jet remains equal to that due to the head in the discharger, and hence you will observe that unless this is reduced below the level of the overflow, the head in the recipient is fully maintained to that level, though the whole quantity discharged is wasted between the orifices.

When the supply is altogether cut off, both cisterns simultaneously empty themselves, the two jets meeting between the orifices, and becoming spread into a beautiful plane disc or film of water at right-angles to the line of discharge; but you will notice that from some inequality in the commencement of the action, and to some extent probably from a quasi-instability in the equilibrium of the double discharge, one of the jets will presently for a moment get the better of the other and drive it back so as almost to arrest its flow, and thus for the moment arrest also the waste of head on that side; but the momentary excess of head thus occasioned almost instantly asserts its superiority, producing a jet of superior force, and thus driving back for a moment the opponent by which it had just before been mastered. Thus a curious oscillation of discharge ensues, which is to a large extent a true dynamic phenomenon somewhat analogous to that which becomes established in an inverted syphon partly filled with water, if for a moment the head is increased in one of the legs; the reaction which in the syphon is furnished by its continuing through the bend, is, in the case before you, furnished by the dynamic reaction of the jets, but the circumstances here

involve an instability which does not exist there, so that the small initial disturbance presently magnifies itself into one of considerably greater range.

This curious corollary phenomenon of the alternated retardation of discharge, though not strictly relevant to the main object of the experiment, is nevertheless highly interesting in itself and tends to enlarge our apprehension of some of the characteristic features of fluid dynamics.

(To be continued.)

NOTES

TUESDAY being St. Andrew's Day, the anniversary meeting of the Royal Society, as required by their charter, was held. The President, Dr. Hooker, began his address with a few remarks on the large number of eminent Fellows whose names appeared in the death-list of the past year, and then gave a summary of the numerous measures for "the improvement of natural knowledge" undertaken by the Society. These comprise the publication of papers in the "Philosophical Transactions," in a separate form; preparation of additional volumes of the catalogue of scientific papers; the labours of committees in connection with the Transit of Venus Expedition, and the researches of naturalists in Kerguelen and Rodrigues; the Eclipse of the Sun Expedition to Siam, the Polar Expedition, the voyage of the *Challenger*, and of the Committees appointed to consider the suggested modification of the regulations under which candidates are elected into the Society. The auditors' report showed that the pecuniary resources of the Society were in a satisfactory condition, and Dr. Hooker mentioned the bequests made to the Society by the late Sir C. Wheatstone and Mr. H. Dircks. The medals were then presented, the Copley medal to Dr. Hofmann, a Royal medal to Mr. Crookes, and a Royal medal to Dr. Oldham (at present in India), through Prof. Ramsay. The proceedings terminated with the election of council and officers (comprising the list of names already published) for the ensuing year. We hope to refer at length next week to the President's address. The anniversary dinner was held at Willis's Rooms, Dr. Hooker in the chair, supported by the Marquis of Salisbury, Lord Cardwell, Mr. W. H. Smith (of the Treasury), the Right Hon. Robert Lowe, Mr. Farrer, Admiral R. Hall, Mr. Lyon Playfair, Dr. Hofmann, Mr. Crookes, and a large number of the Fellows of the Society and their friends.

ON Monday night there was a pleasant and lively meeting at the Royal Geographical Society, over Mr. Stanley's work on the Victoria Nyanza. The paper read was by Col. Grant, C.B., the old companion of Speke, and he awarded hearty praise to Stanley, whose work he estimated as of high geographical importance. At the same time he showed that Stanley's discoveries seemed to confirm the discoveries of Speke as far as these went. The former estimates the circumference of the lake at 890 geographical miles, which coincides essentially with Speke's estimates. Sir Samuel Baker spoke much to the same effect as Col. Grant, both as regards Stanley and Speke, as did also Capt. Burton, while Mr. Edwin Arnold acted the part of Stanley's representative. It was announced that the Church Missionary Society are to take advantage of King Mtesa's invitation to send out missionaries; Sir Samuel Baker believes that the good Mtesa mistook Stanley for Livingstone, whom he had been informed might be expected from the south. Sir H. Rawlinson read some extracts from Col. Gordon's letter on the Albert Nyanza, which he trusted would also be explored by Mr. Stanley.

THE Queen has conferred upon Dr. W. B. Carpenter, F.R.S., the honour of the Companionship of the Civil Division of the Order of the Bath.

THE Royal Academy of Sciences of Berlin has elected Dr. Frankland and Prof. A. W. Williamson, of London, corresponding members of the section of Physics and Mathematics.

MANY of the readers of NATURE will be grieved to hear that Prof. Friedrich Albert Lange died at Marburg, after severe suffering, on the 21st of November. A great career was opening before him when he was smitten by the illness which killed him. His principal work is the "History of Materialism," a second edition of which he had completed shortly before his death. This work will long remain a monument of honour to his memory—an ensample alike of comprehensive learning and of profound and elevated thought.

THE three vacant seats on the Senate of the University of London have been filled by the appointment of Dr. Hooker, Pres. R.S., and the Dean of Lincoln (Dr. Blakesley), directly by the Crown, and Mr. J. G. Fitch on the nomination of Convocation.

WITH reference to Dr. Acland's late pamphlet on the future site of the Oxford Botanic Gardens, in the form of a letter to Dr. Hooker, the Professor of Botany (Mr. Lawson) draws attention to the fact that the question of retaining them upon their present site or of removing them to the Parks is now *sub judice*, and that till Council deems fit to announce the result of their deliberations it would be highly inexpedient for the Professor of Botany to enter into any discussion on the matter, and he requests members of the University to suspend their judgment until such time as the question can be placed before them in all its bearings.

DR. L. S. FORBES WINSLOW has been appointed to the chair of Psychological Medicine at Charing Cross Hospital.

TELEGRAMS from Prof. Palmieri state that the interior of the crater created by the last eruption of Vesuvius has given way. A dark smoke issues from the volcano, and he thinks an eruption is consequently to be expected, but perhaps not immediate.

FROM additional notes on the Meteorological Congress at Poitiers which we have received, we learn that nineteen departments surrounding Poitiers are formed into a permanent meteorological union called "Ouest-Oceanien," for the purpose of organising weather forecasts in the interests of agriculture, and of tracing the paths of thunderstorms. Another similar association will be established at Bordeaux for the south-western provinces. Next year the "Ouest-Oceanien" will hold its second yearly meeting at Tours. It has been decided that a barometer, constructed on an improved plan by M. Redier, shall be sent to each chief town of an *arrondissement*, as also the telegrams from the Paris Observatory giving the meteorological news transmitted by the international service. The resident meteorologists are to take advantage of these general warnings in issuing special predictions. These efforts will promote the meteorological investigations and multiply the number of observers. It is expected that the Paris Observatory will commence to issue daily bulletins and maps similar to those which for a long time have been issued by the U.S. Signal Service, showing up to what extent their predictions have been warranted by facts. M. Alluard, Director of the Puy de Dôme Observatory, was present at the Congress, and gave interesting details as to the state of the works, which are progressing favourably. In the course of a few months the observations will begin at the top of the mountain, and by the month of May next the works will be opened for inspection by men of science of all nations. The presence of a large number of delegates from various parts of France enabled the Congress to pass resolutions of so general a character as to insure everywhere uniformity of action, and the establishing, on a satisfactory basis, of an *Atlas Météorologique de la France*.

THE *South Australian Register* contains a short account of the exploration of the large river in New Guinea referred to in our last number. The details are given in connection with the report of the return of Mr. Macleay's expedition in the *Chevert*, which

became disorganised, Mr. Macleay and Capt. Edwards having disagreed. The scientific portion of the expedition proceeded to New Guinea in a missionary vessel, probably the *Ellangowan*, the same which is reported to have sailed up the Baxter River. The details, evidently supplied by some one who had been on board the *Ellangowan*, published in the *Register*, are substantially the same as those given in Mr. Smithurst's letter. Large cloven hoof tracks are reported to have been seen, as also the monstrous bird referred to by Mr. Smithurst. Lieut. Robert H. Armit, R.N., writing to the *Daily News*, states that the position of the supposed newly-discovered river in New Guinea, as given by Mr. Smithurst—lat. 8°38' S., long. 141°59' E.—clearly proves it to be none other than the one discovered by the officers of her Majesty's ship *Fly*, and which to this day bears the name of that vessel.

PROF. HENRY'S Smithsonian Report for the year 1874, the New York *Nation* states, gives a good account of the management and varied usefulness of the Institution. Among the publications in progress or contemplated are a "complete index to all the species of plants of North America, with their synonyms and all descriptions and important references to them;" a new and enlarged edition of Schott's "Tables of Rain and Snow in the United States;" a general discussion of the winds of the globe; a discussion of all the observations made on the temperature of the U.S. from the earliest times; and a work on the geographical distribution of American thunder-storms. The papers which usually accompany the Report and give it a permanent value are in this case Arago's eulogy on Laplace, Mailly's on Quetelet, and Dumas's on De la Rive; Prof. Hilgard's interesting lecture on tides and tidal action in harbours; De Candolle's notable chapter advocating the English as a dominant language for science; a translation (continued from the previous report) of Morin's elaborate treatise on warming and ventilation; and a letter, by Prof. Warren du Pré, on the so-called North Carolina earthquakes, which literally "made so much noise" in February and March of last year. Prof. du Pré attributes the shakes and explosions to volcanic or earthquake energy, but Prof. Henry inclines to think them caused by either a gradual depression or elevation of the mountain. The stories of issuing smoke and flame were fabulous. The last sixty pages of the Report are given up to Ethnology, with a view to presenting as complete information as possible concerning the location and character of ancient earthworks in America. The accounts here given range from New York to Oregon in one direction, and to Florida and Mississippi in others.

M. BONNAT, a French explorer of the Gold Coast, who had been taken prisoner by the Djuabin, has managed to escape, and is continuing his work along the banks of the Volta, under the protection of Ashantees, amongst whom he is said to have become a favourite.

THE Auricula is said to be the only Alpine plant which has come into general cultivation in the gardens of the rest of Europe. In a pamphlet entitled "Die Geschichte der Aurikel," Prof. Kerner traces the history of the discovery and cultivation of this plant, from the time of L'Escluse (Clusius), who first transplanted this species and the hybrid *P. pubescens*, Jacq., in 1582 from the Tyrolean Alps to Belgium. The latter species, and not the true *P. Auricula*, L., which quickly disappeared from cultivation, is believed by Prof. Kerner to be the real ancestor of the cultivated auriculas of our gardens. The two were known at the time of Clusius under the names of "Auricula-ursi I." and "Auricula-ursi II.," from the supposed resemblance in the shape of the leaves to that of the ear of a bear. The hybrid *P. pubescens*, which had been lost from the German and Austrian Alps for nearly three centuries, was rediscovered by Prof. Kerner in 1867 in a single locality in the Tyrol.

A VERY severe shock of earthquake occurred at Gisborne, New Zealand (east coast), on Sept. 14. Strong shocks were also experienced at Wellington and Blenheim.

A NEW monthly magazine is to be started at Dunedin, of the same character as the *Contemporary Review*.

ACCORDING to a letter published in the *East Anglian Times* of Nov. 24, it would appear that the Corporation of so important a town as Ipswich still authorises the use of local mean time within its liberties, and the business of the place is actually regulated by its edict. Railway time has there a distinct meaning, being 4 min. 40 sec. later than that in general use. We believe that Norwich is in an equally unscientific state as regards time-keeping. It is quite time that an end was put to this absurdity, and we hope some pressure may be brought to bear upon the authorities to effect the long-delayed and desirable introduction of Greenwich time.

In the October number of the *Quarterly Journal of the Meteorological Society of London*, appear several papers of interest, including one by Dr. Mann, the President, on some practical points connected with the construction of lightning conductors, one by Mr. Symons on a white rain or fog bow, and two very valuable and suggestive papers by the Hon. Ralph Abercrombie, on certain small oscillations of the barometer, and on barometrical fluctuations in squalls and thunderstorms. It may be suggested that the printed "Discussions" on the several papers, however interesting to the members, might be curtailed with great advantage.

THE tri-daily Weather Maps of the United States for the first six months of the present year, issued under the vigorous direction of Brigadier-General Myer, have been received. They show with admirable clearness and distinctness, by the style of printing in colours adopted, the outstanding features of the weather thrice a day. These truly magnificent maps give in every case the weather probabilities for each of the great divisions into which the States have been grouped for this purpose, that are likely to follow within the twenty-four hours then *next ensuing*, and also the actual weather which has been experienced during the *past* twenty-four hours. This method is deliberately adopted by the Office for the express purpose of exhibiting equally its successes and its failures in issuing the weather probabilities, and with the further view of receiving assistance from scientific men, who are thus put in possession of materials for studying the subject, by which the rules that have led to the successes may continue to be followed, and those which have caused the failures may be avoided.

MR. STANFORD has published a handy map of India, showing the route originally sketched for the Prince of Wales's tour. Its moderate price and clearness will recommend it to many who wish to follow the Prince in his wanderings.

THE *Bulletin de la fédération des Sociétés d'Horticulture de Belgique* for 1874, published under the authority of the Ministry of the Interior, gives evidence of the extent to which horticulture is made a scientific study in that little kingdom. It contains the reports of no less than twenty-five horticultural and agricultural societies affiliated to the Federation; and a list of twenty-one practical questions, for the best solution of which prizes, varying in value from 100 to 500 francs, are offered. There is also appended Prof. Morren's biographical notice of Clusius, to which we have already alluded, and a third edition, completed to October 1875, of the list of the Botanic Gardens, chairs of Botany, and Botanical Museums, throughout the world.

AN admirable epitome of our knowledge respecting the vegetable palæontology of the United States is contained in M. Leo Lesquereux's reprint, "A Review of the Fossil Flora of North

America," printed under the authority of the Department of the Interior. An idea will be conveyed of the wonderful advance of this knowledge in recent years, by the statement that in 1850 Brongniart described in his "Végétales Fossiles" eighteen species of land-plants from North America, whereas upwards of 1,000 species are now known. Of the numerous fossil plants brought by Dr. H. F. Hayden from his exploration of the Western Territories, and found in strata belonging to the Cretaceous formation, by far the majority are remains of Dicotyledons, and included within all three sections, of Apetalæ, Gamopetalæ, and Polypetalæ; and as far as reliance can be placed on characters derived from the foliage alone, a large number belong to genera widely distributed at the present time. The Lower Lignitic flora, on the contrary, belonging to Tertiary times, presents far less resemblance to that at present prevailing in the northern part of North America, but is of a much more southern type.

A BELGIAN practitioner has published a work on the "Maladies which are special to Mystics," the purport of which is to show that Louise Lateau and other persons of the same description might be really total abstainers from food for a lengthened period. The *Revue Scientifique* announces that the Belgian Society of Medicine has ordered that work to be published in its *Comptes Rendus*. M. Charbonnier, the author, advocates the theory that people may subsist without food because the nitrogen from the air can be admitted into the circulatory system, when the body has been emaciated by long abstinence. Feeding on air is an economical way of keeping soul and body together.

AT the opening of the Belfast Natural History and Philosophical Society, the president, Prof. Hodges, delivered an address, in which he reviewed the industrial progress of the North of Ireland. The address was fully reported in the *Northern Whig* of Nov. 11, and has since been separately reprinted.

WE have received the programme of the Cambridge Higher Local Examinations for 1876, for all who have completed the age of eighteen years before January next. The examinations are for both men and women, and the successful candidates are divided into two groups, those who obtain honours and those who do not. The subjects of examination are divided into six groups, one of which includes botany, geology, zoology, and chemistry. The programme seems to us carefully drawn up; an excellent selection of text-books is given.

PROF. NORDENSKJÖLD ON THE JENISEI

THE following extract from a letter from Prof. Nordenskjöld to Mr. Oscar Dickson, dated Tomsk, Oct. 13, appears in the *Göteborgs Handels Tidning*. It describes his exploration of the river Jenisei after the departure of the *Pröven* on its homeward journey. Nordenskjöld, Lundström, and Stuxberg left the mouth of the Jenisei on August 19, in a boat built for the purpose, and well provisioned and equipped:—

"The course was taken along the shore within the multitude of low bare rocky islands which bound the mouth of the Bay of Jenisei on the north, and are named in the Russian maps, Severo-Wostotschnoi Ostrow (North-east Islands). The sounds between these islands were thought to be sufficiently deep even for large vessels, though perhaps a little fouled by rocky ground. With a favourable wind and smooth water we sailed without any considerable rest in forty-two hours without a break to Cape Schaitanskoi, arriving there the night before the 21st, thoroughly drenched and worn out with our long watch. During this time we landed only at two places, the first time at a point within Jewremow Kamen, the last rocky promontory which occurs on the eastern bank of Jenisei for a distance of 100 Swedish (upwards of 600 English) miles.

"Jewremow Kamen itself consists only of a peculiarly formed dolerite rock fifty or sixty feet high. At the bank were still collected, but for the last time during our passage up the Jenisei, true marine animals; an Appendicularia, *Clio*, large Beroidea, various Medusæ, &c. By a land excursion here we